

WHAT IS CLAIMED:

1. A method for depositing silicon oxide on a substrate comprising the steps of introducing a silicon organic precursor and ozone into a deposition zone where a substrate is located.

2. The method of claim 1 where the deposition is performed by chemical vapor deposition and comprises at least one cycle comprising the following steps:

(i) introducing a silicon organic precursor into a deposition zone where a substrate is located; and
(ii) introducing ozone into the deposition zone.

3. The method of claim 2 where the steps are performed simultaneously.

4. The method of claim 2 where the steps are performed sequentially.

5. The method of claim 1 where the deposition is performed by atomic layer deposition and comprises at least one cycle comprising the following sequential steps:

(i) introducing a silicon organic precursor into a deposition zone where a substrate is located;
(ii) purging the deposition zone; and
(iii) introducing ozone into the deposition zone.

6. The method of Claim 1 wherein the silicon organic precursor is selected from tetramethyldisiloxane (TMDSO), hexamethyldisiloxane (HMDSO), hexamethyldisilazane (HMDSN), and silicon tetrakis(ethylmethyamide) (TEMASi), alkylsilane, alkylaminosilane, alkylaminodisilane, alkyloxysilane, alkylsilanol, alkyloxysilanol.

7. The method of Claim 1 wherein the silicon organic precursor has the formula $\text{Si}(\text{NR}^1\text{R}^2)_{4-w}\text{L}_w$ where R^1 and R^2 are, independently, selected from hydrogen, C_1 - C_6 alkyl, C_5 - C_6 cyclic alkyls, halogen, and substituted alkyls and cyclic alkyls, where w equals 1, 2, 3 or 4, and where L is selected from hydrogen or halogen.

8. The method of claim 1 wherein the silicon organic precursor has the formula $\text{Si}_2(\text{NR}^1\text{R}^2)_{6-z}\text{L}_z$, where R^1 and R^2 are, independently, selected from hydrogen, C_1 - C_6 alkyl, C_5 - C_6 cyclic alkyls, halogen, and substituted alkyls and cyclic alkyls, where z equals 1, 2, 3, 4, 5 or 6, and where L is selected from hydrogen or halogen.

9. The method of Claim 1 wherein the deposition zone is maintained at a pressure ranging from 1 mTorr to 760 Torr.

10. The method of Claim 1 wherein the deposition is performed at a temperature between 200°C to 400°C .

11. The method of Claim 1 wherein the ozone is introduced into the deposition zone provides an ozone concentration in the range 10 to 400 g/m^3 .

12. The method of Claim 1 where the substrate is a silicon substrate, ceramics, metals, plastics, glass, and organic polymers.

13. A method for depositing silicon oxynitride on a substrate comprising the steps of introducing a silicon organic precursor, ozone, and a nitrogen source into a deposition zone where a substrate is located.

14. The method of claim 13 where the deposition is performed by chemical vapor deposition and comprises at least one cycle comprising the following steps:

(i) introducing a silicon organic precursor into a deposition zone where a substrate is located;

(ii) introducing ozone into the deposition zone; and

(iii) introducing a nitrogen source into the deposition zone.

15. The method of claim 14 where the steps are performed simultaneously.

16. The method of claim 14 where the steps are performed sequentially.

17. The method of claim 13 where the deposition is performed by atomic layer deposition and comprises at least one cycle comprising the following sequential steps:

(i) introducing a silicon organic precursor into a deposition zone where a substrate is located;

(ii) purging the deposition zone; and

(iii) introducing ozone and a nitrogen source into the deposition zone.

18. The method of claim 17 where the ozone and nitrogen source are introduced separately in any order.

19. The method of claim 17 where the ozone and nitrogen source are introduced simultaneously.

20. The method of Claim 13 wherein the silicon organic precursor is selected from tetramethyldisiloxane (TMDSO), hexamethyldisiloxane (HMDSO), hexamethyldisilazane (HMDSN), and silicon tetrakis(ethylmethyamide) (TEMASi), alkylsilane, alkylaminosilane, alkylaminodisilane, alkyloxysilane, alkylsilanol, alkyloxysilanol.

21. The method of Claim 13 wherein the silicon organic precursor has the formula $\text{Si}(\text{NR}^1\text{R}^2)_{4-w}\text{L}_w$ where R^1 and R^2 are, independently, selected from hydrogen, $\text{C}_1\text{-C}_6$ alkyl, $\text{C}_5\text{-C}_6$ cyclic alkyls, halogen, and substituted alkyls and cyclic alkyls, where w equals 1, 2, 3 or 4, and where L is selected from hydrogen or halogen.

22. The method of claim 13 wherein the silicon organic precursor has the formula $\text{Si}_2(\text{NR}^1\text{R}^2)_{6-z}\text{L}_z$, where R^1 and R^2 are, independently, selected from hydrogen, $\text{C}_1\text{-C}_6$ alkyl, $\text{C}_5\text{-C}_6$ cyclic alkyls, halogen, and substituted alkyls and cyclic alkyls, where z equals 1, 2, 3, 4, 5 or 6, and where L is selected from hydrogen or halogen.

23. The method of claim 13 where the nitrogen source is selected from atomic nitrogen, nitrogen gas, ammonia, hydrazine, alkylhydrazine, and alkylamine.

24. The method of Claim 13 wherein the deposition zone is maintained at a pressure ranging from 1mTorr to 760 Torr.

25. The method of Claim 13 wherein the deposition is performed at a temperature below 400°C.

26. The method of Claim 13 wherein the ozone introduced into the deposition zone provides an ozone concentration ranging from 10 to 400 g/m³.

27. The method of Claim 13 where the substrate is a silicon substrate, ceramics, metals, plastics, glass, and organic polymers.

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